Introduction-Lesson A

**Reporting Category** Probability and Statistics

**Topic** Measure of central tendency/Introduction to PBL

**Duration 90 Minutes**

**Primary SOL** 6.15 The student will

a) describe mean as balance point; and

b) decide which measure of center is appropriate for a given purpose.

# Websites/Resources

* Khan Academy Lesson/practice- <http://www.youtube.com/watch?v=GrynkZB3E7M>
* Finding the measure of central tendency- <http://www.kidsmathgamesonline.com/numbers/meanmedianmode.html>
* Interactive practice mean, median, and Mode-<http://www.shodor.org/interactivate/discussions/MeanMedianAndMode/>
* Mean, Median, and Mode Vocabulary song- <http://www.youtube.com/watch?v=qpxtBghmvvs>

# Materials

* Laptop
* Calculator
* Index Cards

# Vocabulary

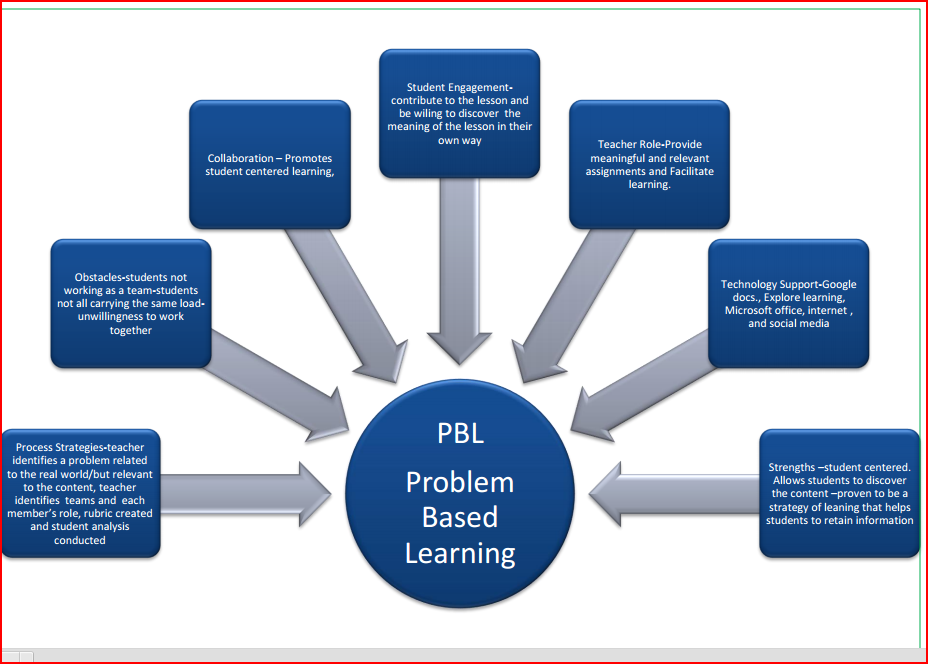
Measure of center, mean, median, mode, fair share (earlier grades)

balance point (6.15)

Vertical Articulation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Collect/ Represent Data | 4.14 collect/organize/display/interpret data from variety of graphs | 5.15 collect/organize/interpret data, using stem-and-leaf plots/line graphs | **6.14 a) construct circle graphs; b) draw conclusions/make predictions, using circle graphs; c) compare/contrast graphs** | 7.11 a) construct/analyze histograms; b) compare/contrast  histograms | 8.13 a) make comparisons/predictions/inferences, using information displayed in graphs; b) construct/analyze scatter plots |
| Measures of Center | | 5.16 a) describe mean/median/mode; b) describe mean as fair share; c) find the mean/median/ mode/range; d) describe range as measure of variation | | **6.15 a) describe mean** **as balance point;**  **b) decide which**  **measure of center is**  **appropriate** | |

PBL Instructional Unit-Graphic Organizer-Explains the process of the components of the activity



**Technology Standard**

*Research and Information Fluency* -Students apply digital tools to gather, evaluate, and use information. Students: a. plan strategies to guide inquiry. b. locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. c. evaluate and select information sources and digital tools based on the appropriateness to specific tasks. d. process data and report results.   
*Critical Thinking, Problem Solving, and Decision Making* -Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students: a. identifies and defines authentic problems and significant questions for investigation. b. plan and manage activities to develop a solution or complete a project. c. collect and analyze data to identify solutions and/or make informed decisions. d. use multiple processes and diverse perspectives to explore alternative solutions.

* **Content Standard:** Virginia SOL 6.15 the student will be able to: a). describe mean as balance point; and b) decide which measure of center is appropriate for a given purpose.
* SOL 6.14 The student, given a problem situation, will a) construct circle graphs; b) draw conclusions and make predictions, using circle graphs; and c) compare and contrast graphs that present information from the same data set.
* **Prerequisite Skills:** Virginia 5.15 collect/organize/interpret data, using stem-and-leaf plots/line graphs and 5.16 a) describe mean/median/mode; b) describe mean as fair share; c) find the mean/median/ mode/range; d) describe range as measure of variation.
* **Objectives, Outcomes, or Framing Question:** Explain how to decide when mean is the best measure of center to describe a data set.
  + Explain how to decide when mode is the best measure of center to describe a data set.
  + Explain how to decide when median is the best measure of center to describe a data set.

# Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Prior to the lesson, create a large number line on which students may affix markers. The number line should start at 0 and extend through at least 20.

1. Teacher begins lesson by asking the students to write a journal on how and why collecting data important.
2. Teacher asks the students to share what they wrote in their journal.
3. The teacher asks the students to define the following vocabulary words in their own words.

* Mean
* Median
* Mode
* Range

1. After the teacher goes over the vocabulary words with the students, the teachers shows the students a quick video about statisticians via brainpop.com (<http://www.brainpop.com/science/scientificinquiry/statistics/preview.weml>) teachers must have an account-but can obtain a free trial by visiting [www.brianpop.com-](http://www.brianpop.com-) if teachers cannot get an account on brainpop.com they call use visit a website that provides a detail job description of a statistician <http://www.bls.gov/ooh/math/statisticians.htm#tab-1>
2. The teacher explains to the students they will use statistics to solve a real world problem as a team of three to four students. The details are below:

**Problem Selection:** Fairfield Middle School is considering opening a snack store to run before and after school. The school needs help to determine the type of soft drinks, chips, candy, and cookies to sale to the students and staff. Using data analysis each group will be responsible for selecting the top two items to sale for each category.

|  |  |  |  |
| --- | --- | --- | --- |
| Group A: Soft Drinks | Group B: Chips | Group C: Candy | Group D: Cookies |
| Cola | Potato Chips (Plain) | M&Ms | Oatmeal Cookies |
| Lime | BBQ chips | Starburst | Chocolate Chip Cookies |
| Grape | Sour Cream and Onion Chips | Skittles | Peanut Butter Cookies |
| Orange | Salt and Vinegar Chips | Fruit chewable | Sugar Cookies |
| Fruit Punch | Doritos | Jolly Ranchers | Macadamia Cookies |

1. The teacher informs the student of their group. Groups we selected by the teacher and vary in the level of skills for each team. Each group consists of two higher level performing students, 1 lower level student and on middle performing students.

**Homework**

Each student should collect data by asking 20 students and faculty member which item they would like from their group’s category to be sold at the school store. The students may used Google survey, Text Messages, or paper and pencil to conduct their survey. This homework must be completed before lesson c.

# Assessment

* + Questions
* Explain how you could collect and record data.
* When your team collects their data should they only select one grade level? Explain.

# Extensions and Connections (for all students)

* Have students also find the median and mode for this data set. Based on the values, have them determine which value depicts the best measure of center for this specific data set and explain why.

# Strategies for Differentiation

* Show students the actual calculation associated with deriving the balance point or mean prior to use of the number line.
* Prior to building up the concept of mean as the balance point, show an example, including manipulatives, of mean as fair share.

**References:**

Education, V. D. (2011). *Statistics and probability* . Retrieved Feburary 12, 2013, from Sequence and Scope : http://www.doe.virginia.gov/testing/sol/standards\_docs/mathematics/index.shtml